## Kelly, Shaheerah

**From:** Eric Albright [ealbright@environcorp.com]
**Sent:** Monday, September 23, 2013 10:47 AM
**To:** Kelly, Shaheerah
**Cc:** Rios, Gerardo; Christenson, Kara; Shane Young
**Subject:** SPI-Anderson - response to Sep. 19 information request
**Attachments:** Response to September 19 information request - final.docx

Shaheerah:

Attached are responses to the request for additional information received from EPA Region 9 by email on September 19 concerning Sierra Pacific Industry's cogeneration project (PSD Permit Number SAC 12-01).

Thanks, and, if you have any questions, please call me at the number below, or Shane Young of SPI at (530) 378-8356.

Eric

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**From:** Kelly, Shaheerah [mailto:Kelly.Shaheerah@epa.gov]
**Sent:** Thursday, September 19, 2013 7:14 AM
**To:** Shane Young; Dave Brown; Eric Albright
**Cc:** Rios, Gerardo; Christenson, Kara
**Subject:** RE: PSD

Good morning,

Thanks again for the previous submittal sent to EPA on September 13. We need a bit more information to assist us in our analysis. Below is the additional information needed.

1. The approximate cost of a cost of a new lumber mill and cogeneration facility. This would be helpful for comparison to the cost of the post-combustion CCS system.
2. The GHG BACT analysis identifies the following control as an available method for reducing N2O emissions: Addition of a N2O-abating SCR system. Please provide cost information, including cost effectiveness data in $/ton, for the assessment of this control option in Step 4 of the GHG analysis.
3. Please provide the actual cost calculations (e.g., spreadsheets) for the cost estimates previously provided for post-combustion CCS and catalytic destruction, as well as for the addition of a N2O-abating SCR system.

I look forward to your response. Feel free to contact me for questions.

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**From:** Shane Young [mailto:SWyoung@spi-ind.com]
**Sent:** Wednesday, September 18, 2013 9:34 AM
**To:** Kelly, Shaheerah
**Cc:** 'Eric Albright (ealbright@environcorp.com)'
**Subject:** PSD

Good morning Shaheerah,

I wanted to follow up on our conversation Monday regarding the responses to EPA's questions pertaining to SPI Anderson PSD permit. You had mentioned a couple of questions that you had and were going to send an e-mail to Eric and myself. How is this coming? As I mentioned, given the urgency of this permit anything you need please get it to us as soon as possible so we can address and get back to you.

Regards

Shane Young
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In an email received by SPI on September 19, 2013 you requested additional information to assist your ongoing review of the GHG BACT analysis submitted in support of SPI's permit to construct and operate a new biomass-fired cogeneration unit at the existing facility in Anderson, California.

We have repeated your information requests in italics below; each request is followed by a response.

1. *The approximate cost of a cost of a new lumber mill and cogeneration facility. This would be helpful for comparison to the cost of the post-combustion CCS system.*

   To construct a lumber manufacturing facility with a production capacity similar to that of the existing Anderson facility would cost approximately $80,000,000. Adding a cogeneration unit similar to that proposed by SPI for the Anderson facility would cost approximately $75,000,000, which is in line with the general industry cost of a cogeneration unit (approximately $2,500,00 per megawatt). The difference between the cost to construct a cogeneration unit in a new location, and the previously provided estimated cost to construct the same unit at the existing Anderson facility (between $40,000,000 and $45,000,000) is the savings realized by SPI acting as their own general contractor, utilizing the existing Anderson facility and SPI fabrication shop.

2. *The GHG BACT analysis identifies the following control as an available method for reducing N2O emissions: Addition of a N2O-abating SCR system. Please provide cost information, including cost effectiveness data in $/ton, for the assessment of this control option in Step 4 of the GHG analysis.*

   As mentioned in the submitted GHG BACT document submitted to Region 9, BASF[1] and Heraeus[2] both offer a catalyst intended to reduce $N_2O$ emissions from process industries (e.g., nitric acid production). BASF indicates that the NOxCAT ZN2O $N_2O$ Catalyst can reduce $N_2O$ emissions by approximately 90 percent at a temperature of approximately 540 °C, when applied to an exhaust stream containing $N_2O$ at a concentration of 1400 parts per million (ppm). Assuming that this technology can be applied to the exhaust from the proposed cogeneration unit, which contains $N_2O$ at a concentration of approximately 6 parts per million (ppm), with the same efficacy, and that the capital cost of the additional selective catalytic reduction (SCR) system would be approximately half that of the standard SCR system used to control $NO_X$, the cost effectiveness, on a $CO_2e$ basis, would be approximately $241 per ton of GHG controlled (see attached table). For comparison, this is approximately 3.5 times more expensive than the cost effectiveness of a carbon capture and storage (CCS) system for a 550 megawatt (MW) pulverized coal plant, as calculated by the National Energy Technology Laboratory.[3] Based on this analysis, we consider use of $N_2O$-abating SCR technology to not be cost effective, and we submit that it

[1] http://www.catalysts.pro/downloads/public/pdfs/Stationary%20Emissions/12011BF-9410_US_NOxCatZN2O_Datasheet-05209.pdf

[2] http://heraeus-catalysts.com/en/catalyticsystems/sekundrkatalysator/sekundrkatalysator_1.aspx

[3] National Energy Technology Laboratory (NETL), "Cost and Performance Baseline for Fossil Energy Plants – Volume 1: Bituminous Coal and Natural Gas to Electricity, Revision 2," November 2010. DOE/NETL-2010/1397. Page 300. http://www.netl.doe.gov/energy-analyses/pubs/BitBase_FinRep_Rev2.pdf

should be removed from consideration as BACT for GHG emitted by the proposed cogeneration unit.

3. *Please provide the actual cost calculations (e.g., spreadsheets) for the cost estimates previously provided for post-combustion CCS and catalytic destruction, as well as for the addition of a N2O-abating SCR system.*

   GHG BACT cost-effectiveness information provided in support of the SPI-Anderson cogeneration unit permit application has primarily been derived from two sources: an NETL report that includes the cost of CCS technology as applied to large (550 MW) pulverized coal power plants,[4] and another NETL report that provides a methodology for calculating pipeline costs.[5]

   While we understand that SPI is proposing a very different type of emission unit, the technology under consideration is similar, and basing cost-effectiveness estimates on those calculated for a large coal-fired power should provide a conservative estimate. Certainly, a larger coal-fired plant would have a greater economy of scale, and the $CO_2$ is most likely more concentrated in exhaust from coal combustion than in exhaust from biomass combustion, which contains more steam per unit of heat input. The International Energy Agency (IEA) has estimated that the cost of CCS for a biomass-fired power plant would be roughly twice that of a coal-fired power plant.[6] Because previously-calculated cost-effectiveness values were quoted, a supporting calculation spreadsheet is not available. The NETL report cited above contains a detailed description of the methodology used for the analysis, and references for the values used in the analysis.

   A description of the methodology used to calculate the cost of a hypothetical pipeline that would deliver captured $CO_2$ from Anderson, California to an oilfield in Brentwood, California, along with a summary of the results of the calculations was provided in an email sent to Region 9 on September 13, 2013. The attached spreadsheet contains the calculations summarized in that email.

   The cost-effectiveness calculations for applying a catalytic destruction system (described in the September 13, 2013 email), and an $N_2O$-abating SCR system (described in item 2 above) to the proposed cogeneration unit for the purpose of reducing GHG emissions, are provided in the attached spreadsheet.

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[4] National Energy Technology Laboratory (NETL), "Cost and Performance Baseline for Fossil Energy Plants – Volume 1: Bituminous Coal and Natural Gas to Electricity, Revision 2," November 2010. DOE/NETL-2010/1397. Page 300. http://www.netl.doe.gov/energy-analyses/pubs/BitBase_FinRep_Rev2.pdf

[5] National Energy Technology Laboratory (NETL), "Quality Guidelines for Energy System Studies: Carbon Dioxide Transport and Storage Costs in NETL Studies", DOE/NETL-2013/1614, March 2013 – http://www.netl.doe.gov/energy-analyses/pubs/QGESS_CO2T%26S_Rev2_20130408.pdf

[6] International E (IEA), "IEA Energy Technology Essentials: $CO_2$ Capture & Storage," December 2006. Page 3. http://www.iea.org/techno/essentials1.pdf